Using PyTorch in the Cloud: PyTorch Playbook

CREATING PYTORCH SOLUTIONS ON AWS

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Overview

AWS SageMaker for machine learning

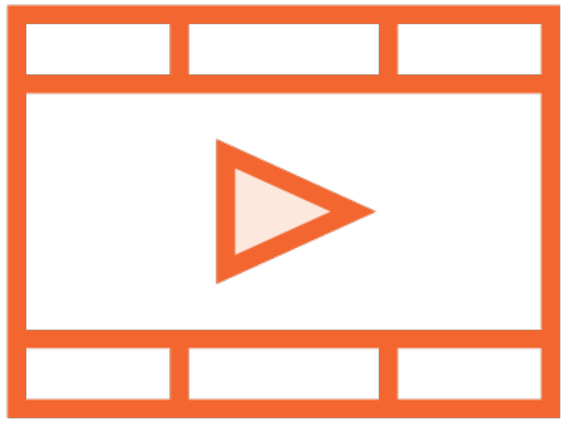
Working with PyTorch on SageMaker notebooks

PyTorch estimators for distributed training in SageMaker

Amazon Machine Images (AMIs) for deep learning with PyTorch

Prerequisites and Course Outline

Prerequisites

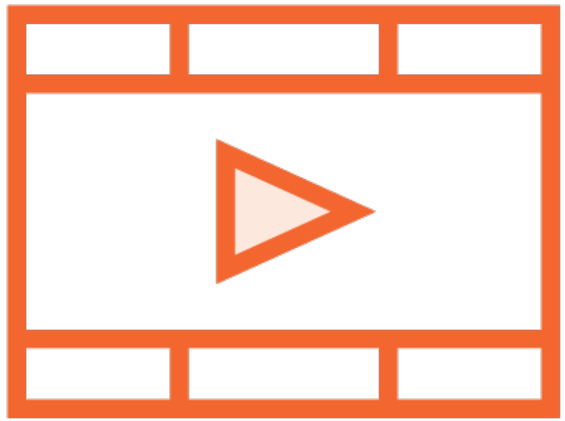


Familiarity with PyTorch

Familiarity with cloud computing

AWS, Azure, GCP

Prerequisite Courses



Foundations of PyTorch

Building Deep Learning Models Using PyTorch

Course Outline

PyTorch on AWS

PyTorch on Microsoft Azure

PyTorch on the Google Cloud Platform

Machine Learning on the Cloud

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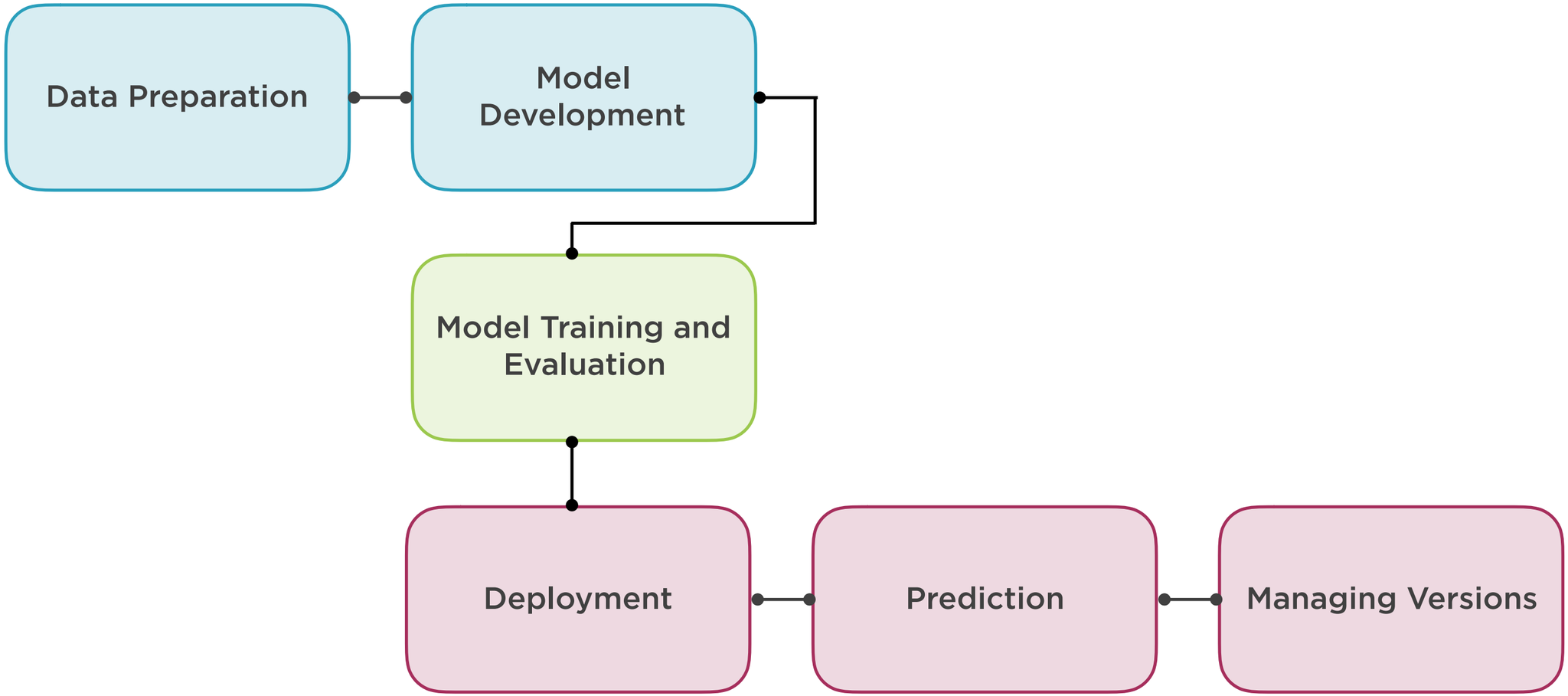

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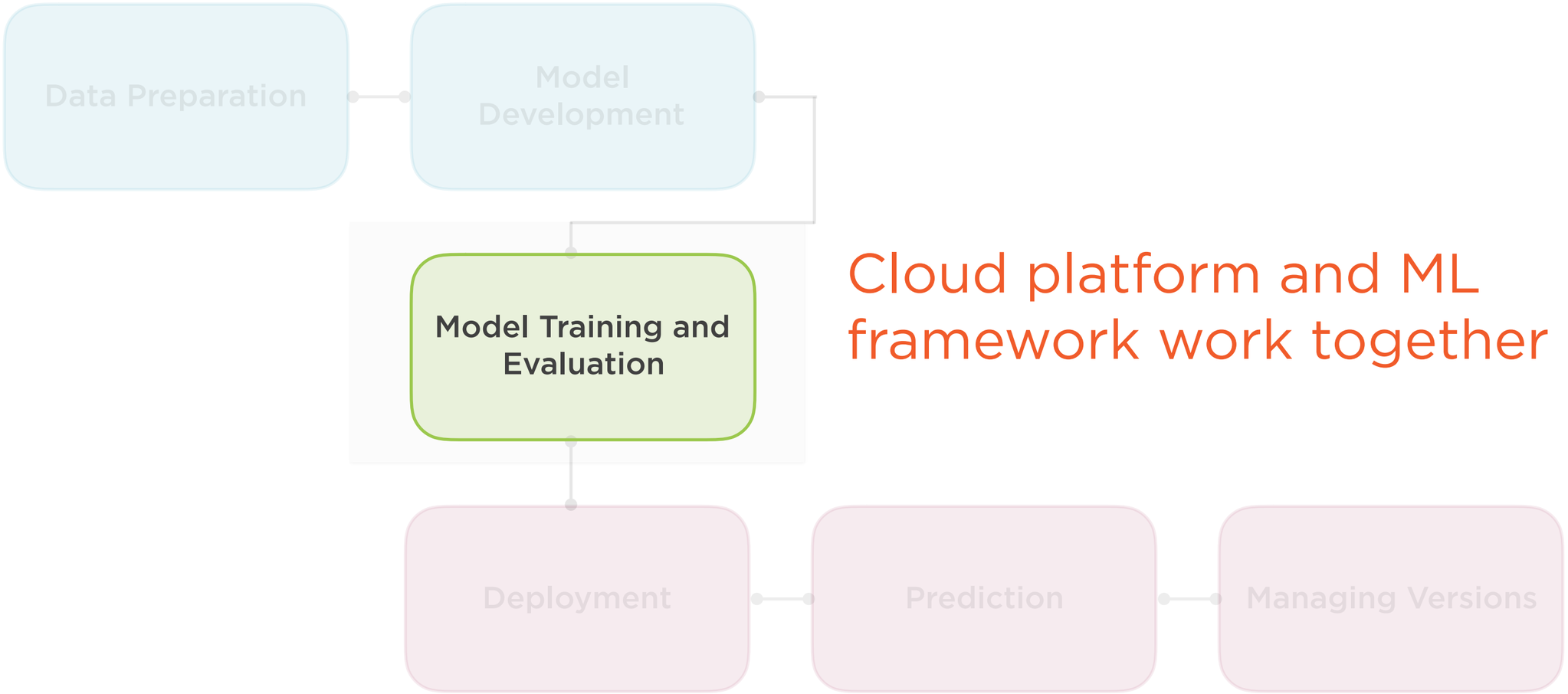
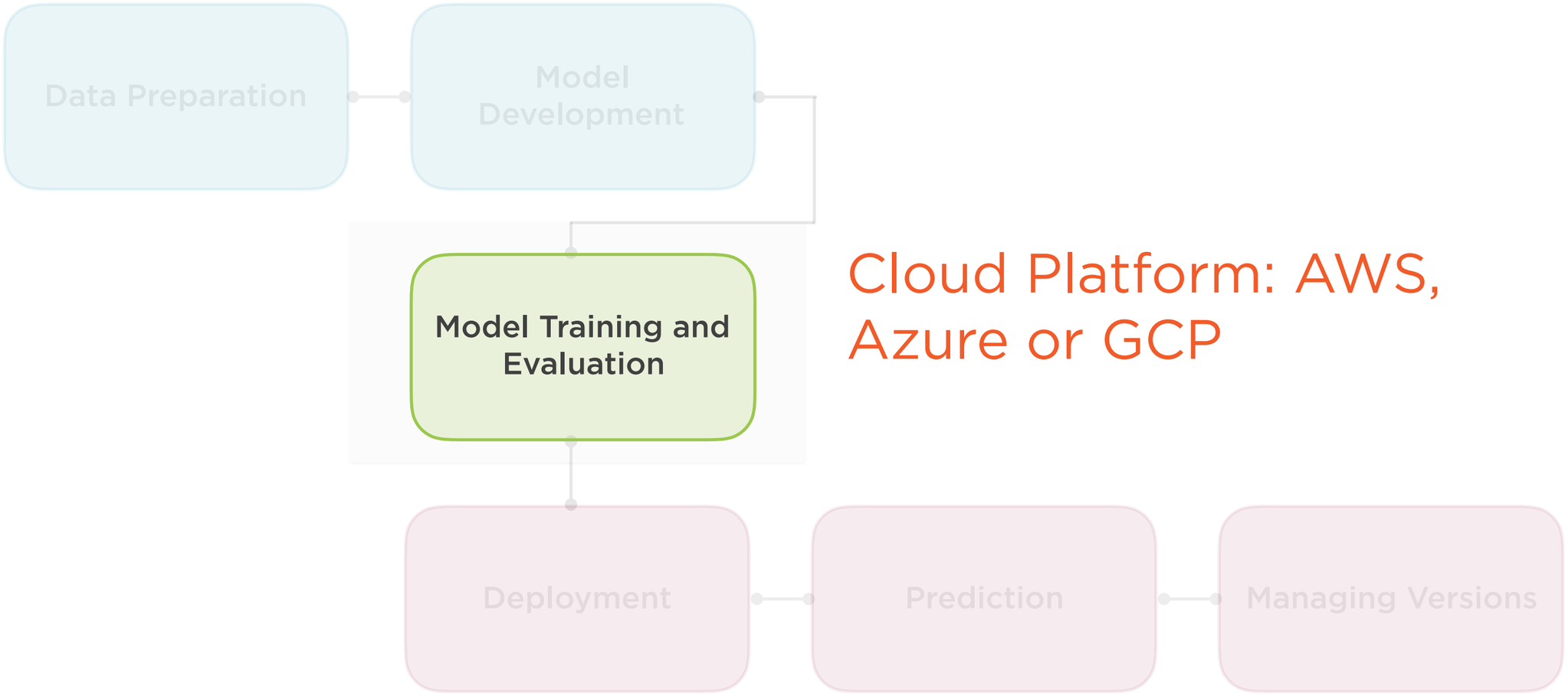


Cloud platform and ML framework work together

Machine Learning on the Cloud



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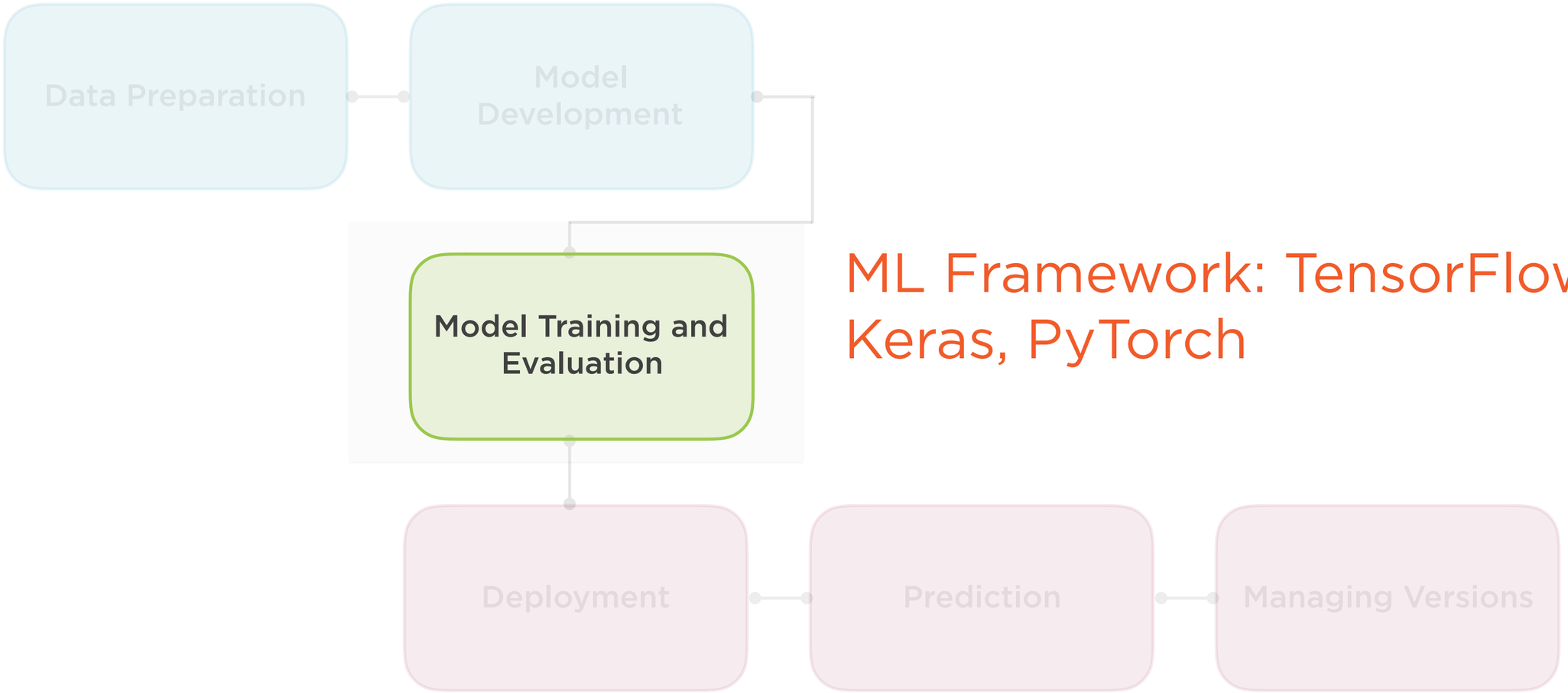
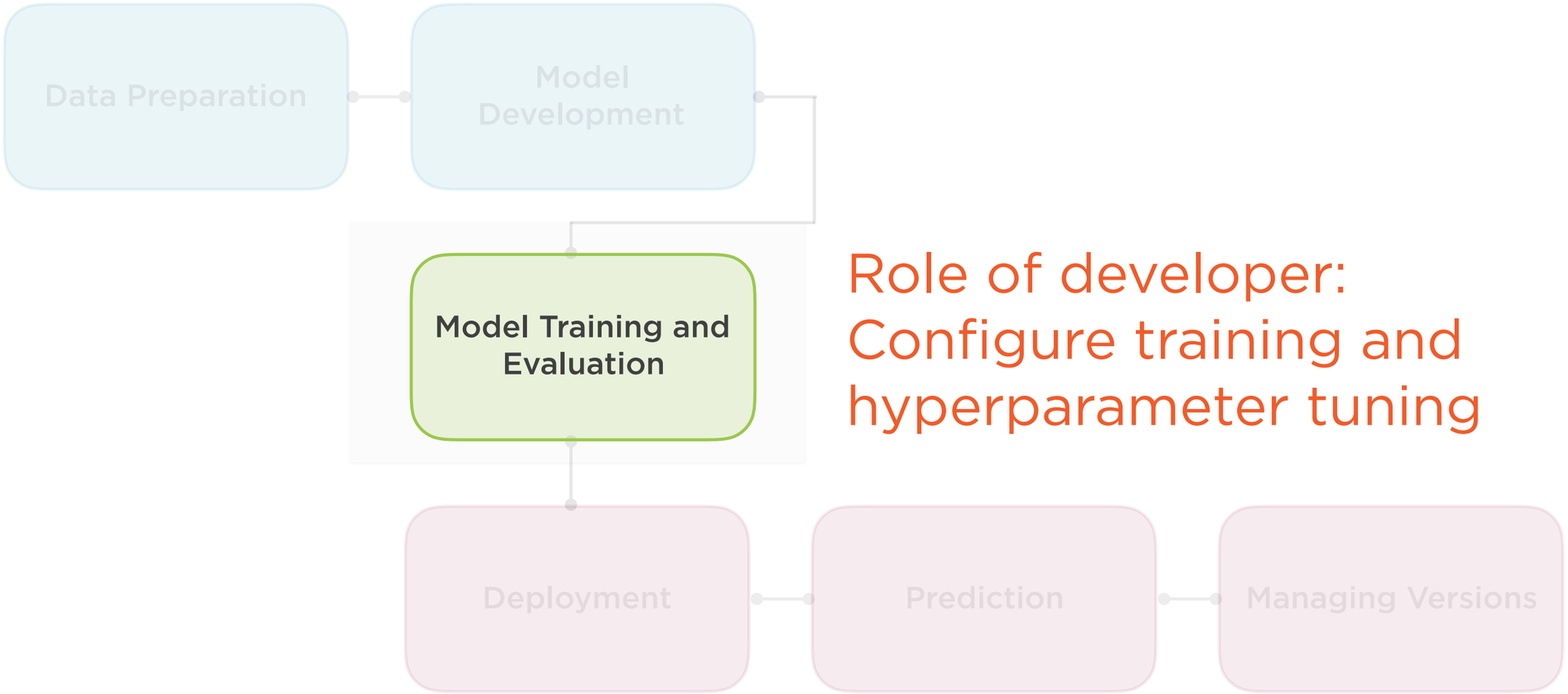


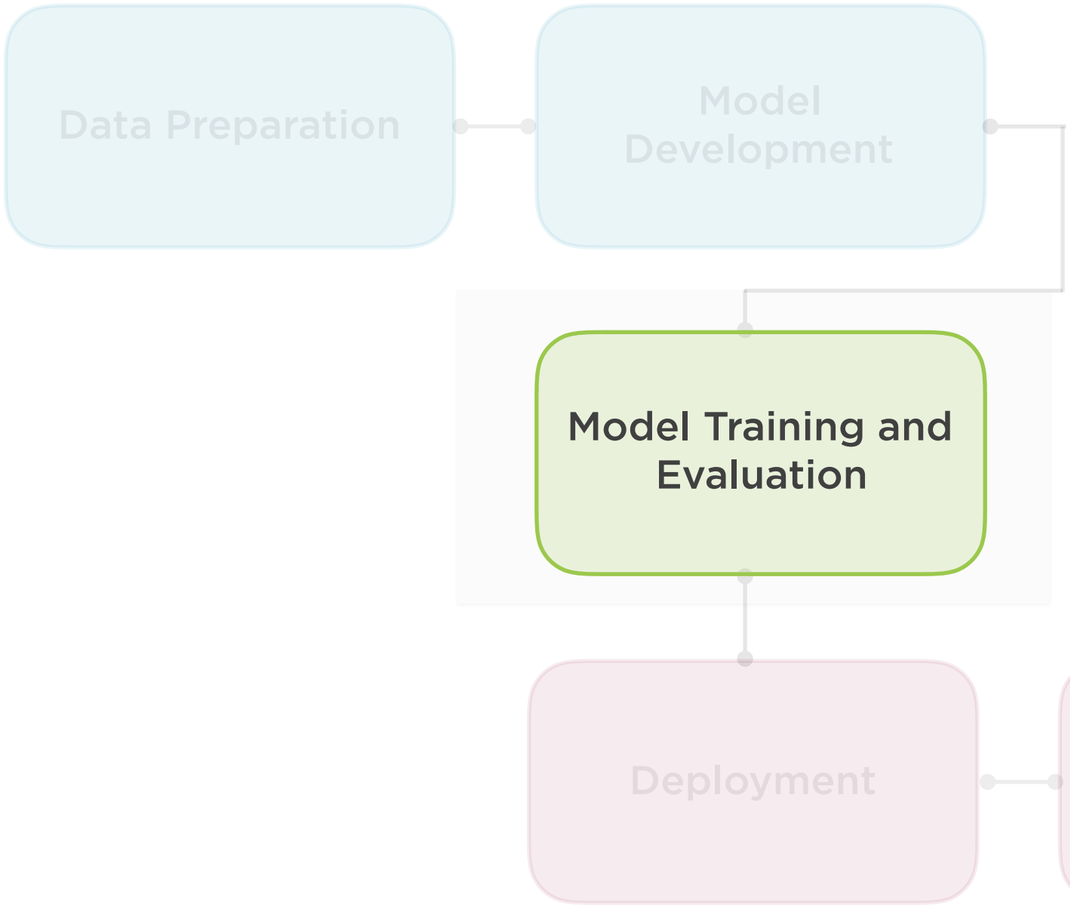
ML Framework: TensorFlow, Keras, PyTorch

Machine Learning on the Cloud



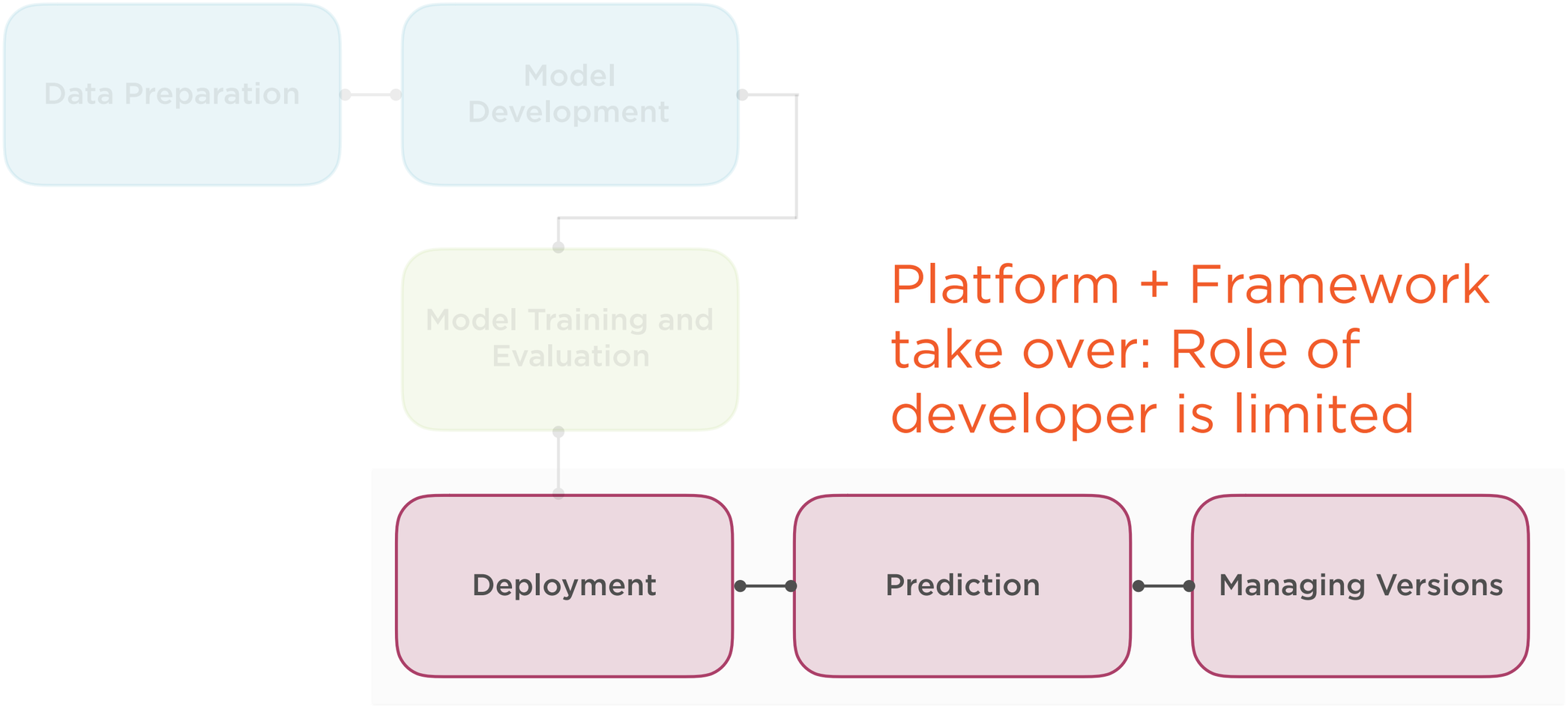
Role of developer:
Configure training and hyperparameter tuning

Machine Learning on the Cloud



Role of (platform + framework): Perform training and hyperparameter tuning

Machine Learning on the Cloud



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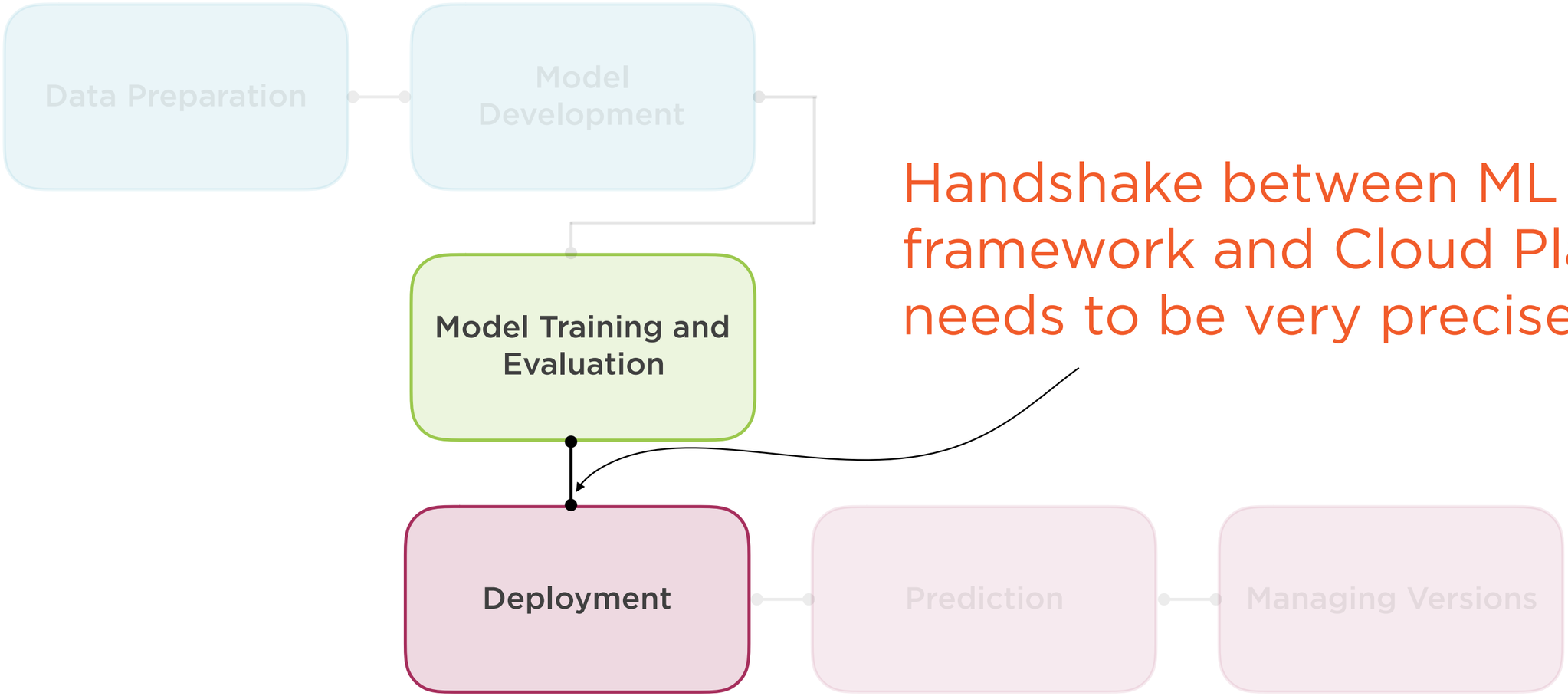

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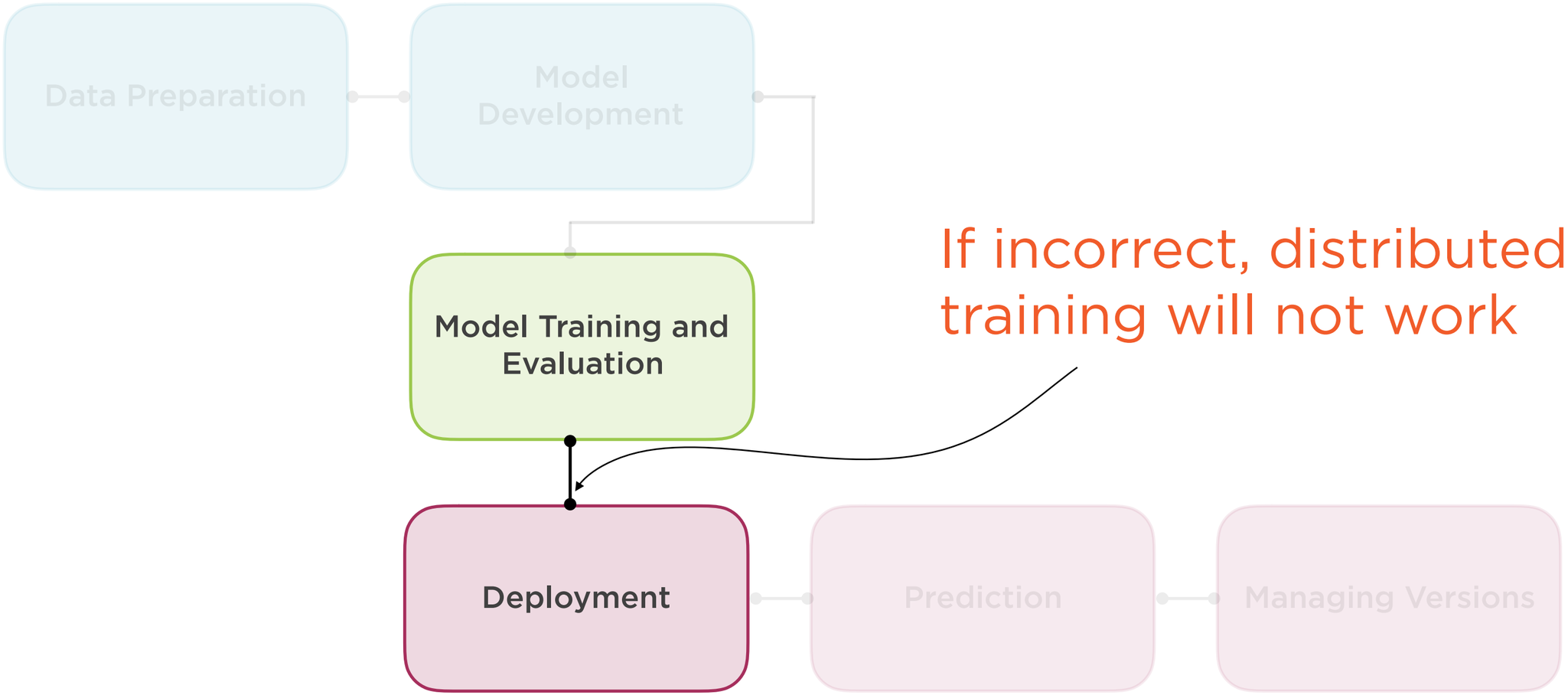
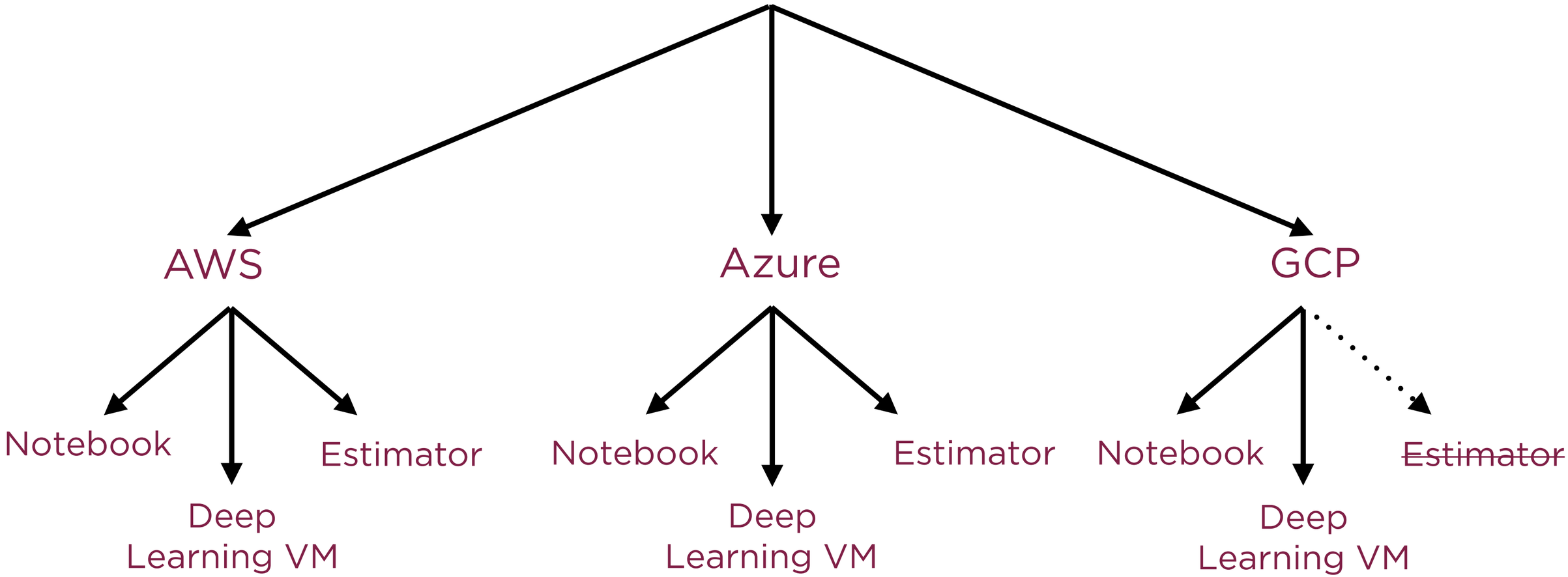


PyTorch on the Cloud: Taxonomy of Solutions

PyTorch on the Cloud



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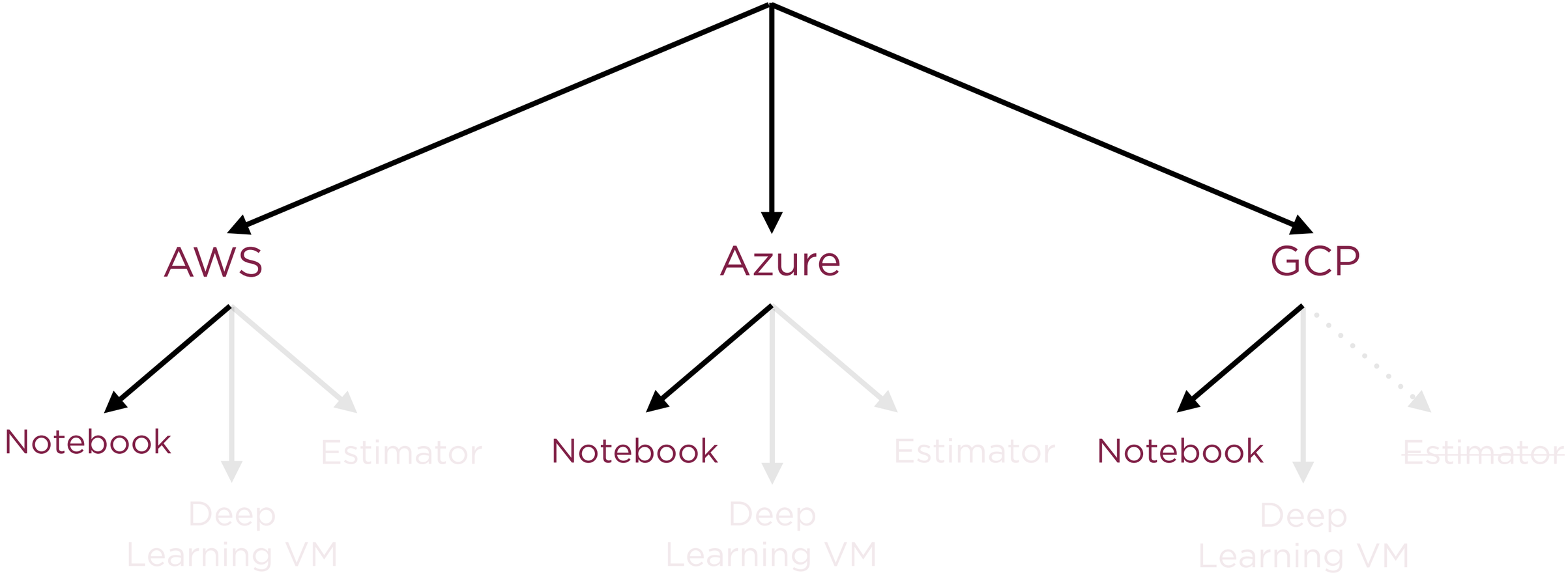
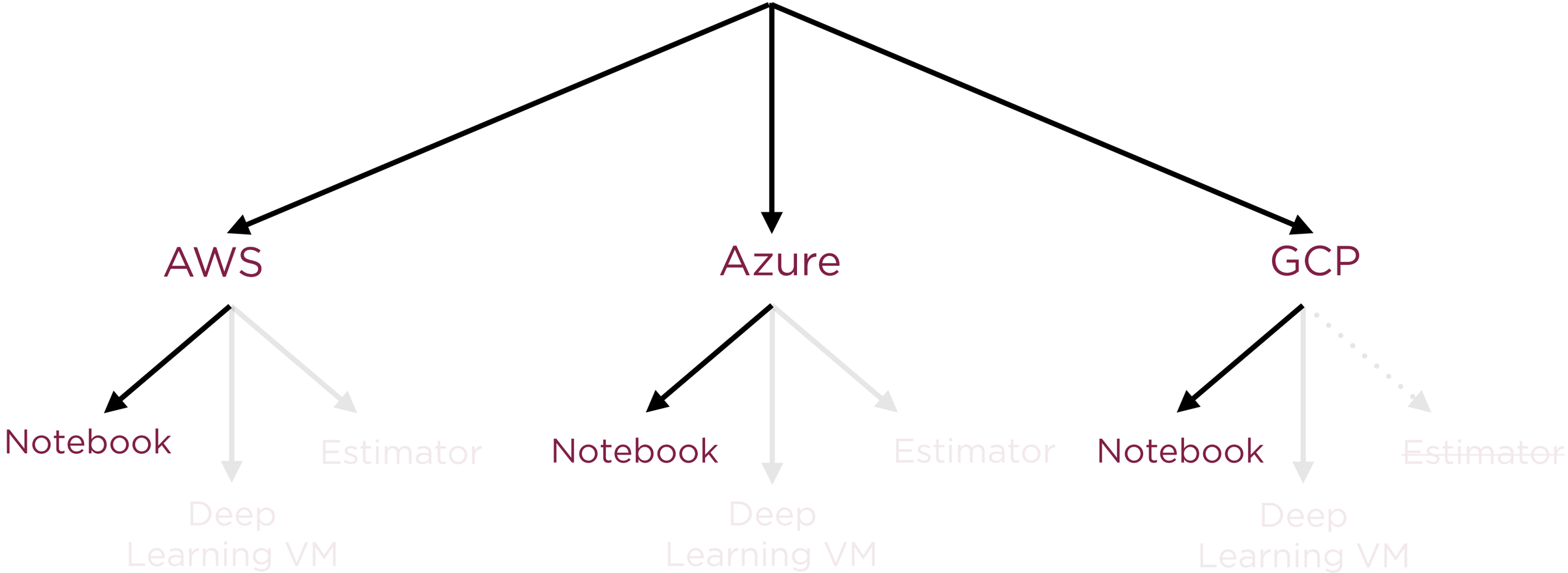


Notebook

Cloud-hosted Python notebook. Could be platform-agnostic (Jupyter) or platform-specific (e.g. Datalab on GCP).

PyTorch on the Cloud



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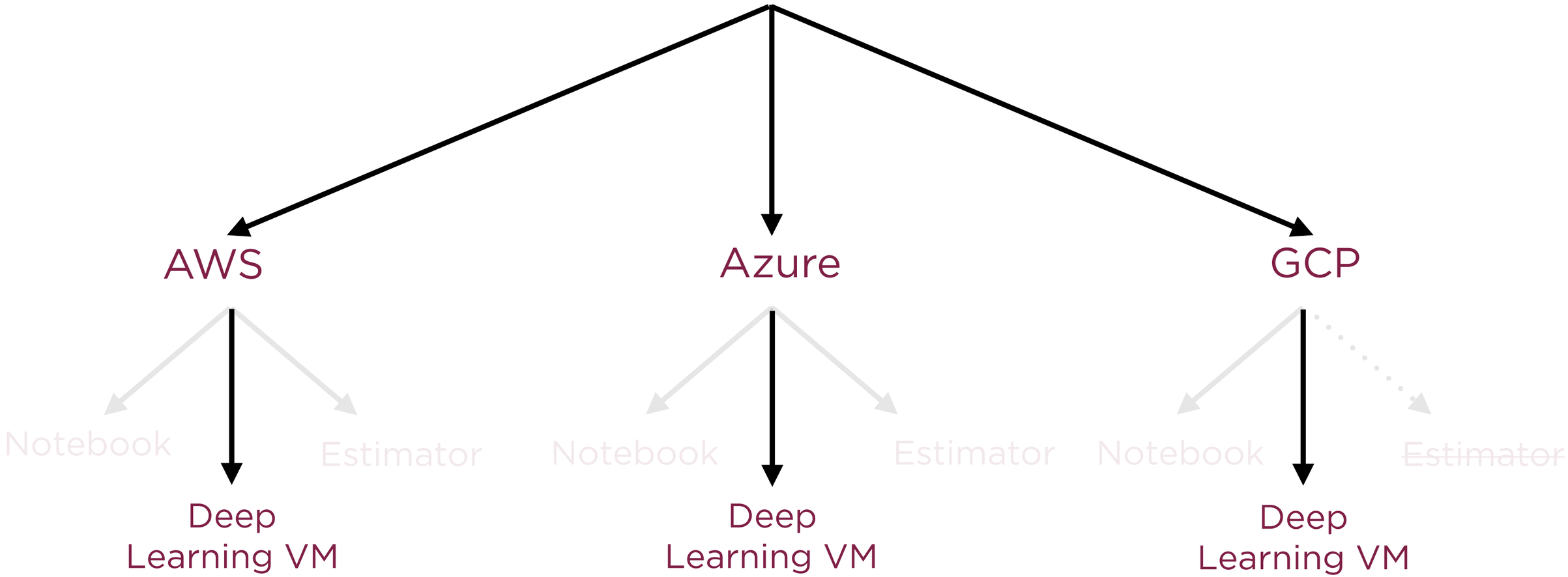
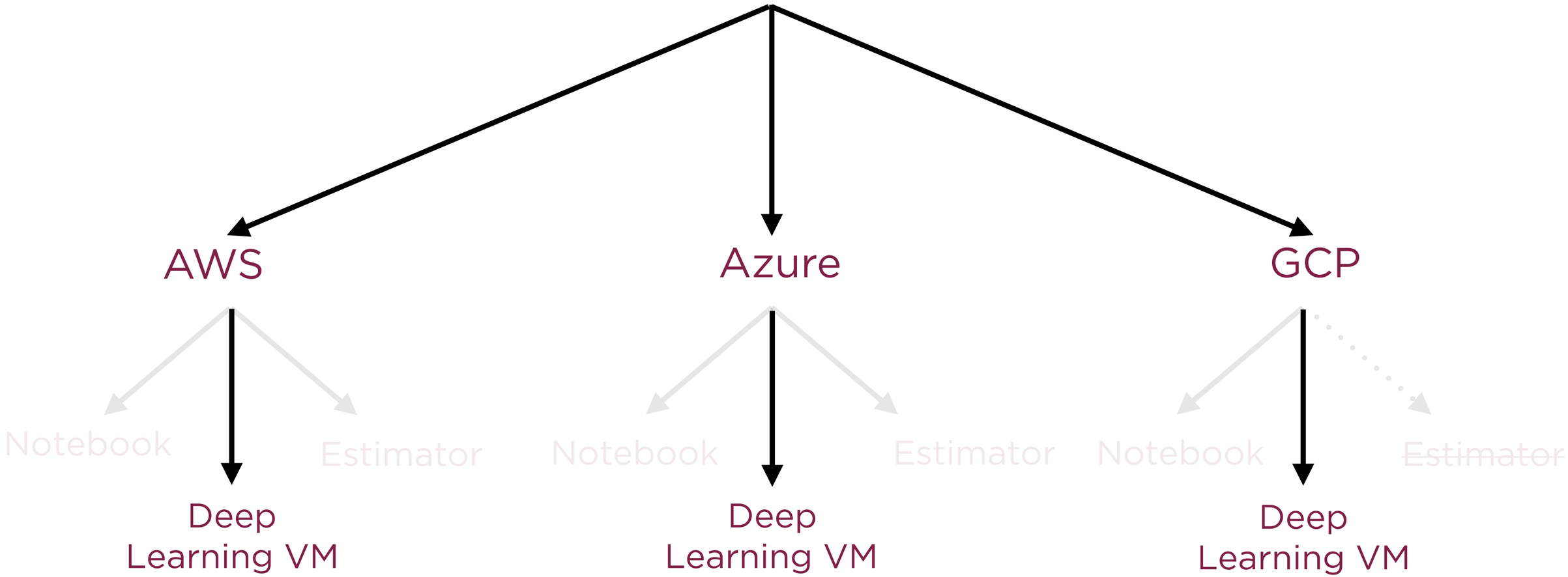


Deep Learning VM

Cloud-specific virtual machine instance (e.g. EC2 on AWS, GCE on GCP) equipped with GPUs for optimized PyTorch performance

PyTorch on the Cloud



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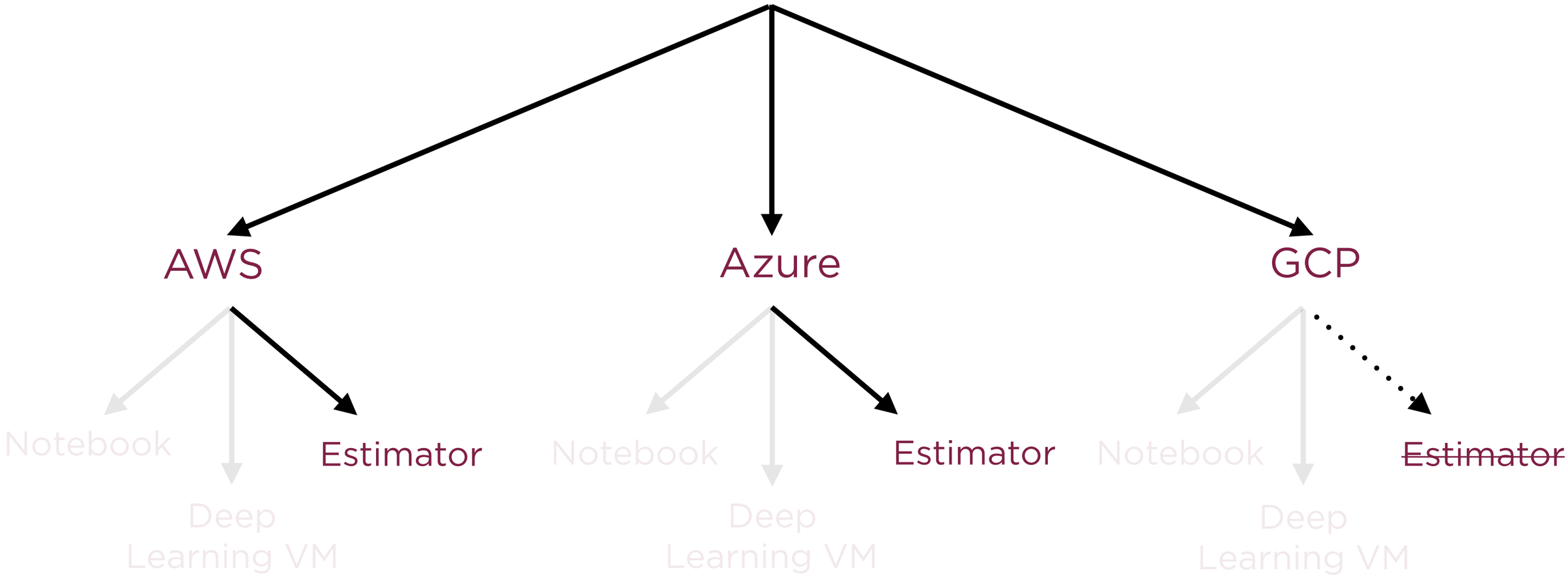
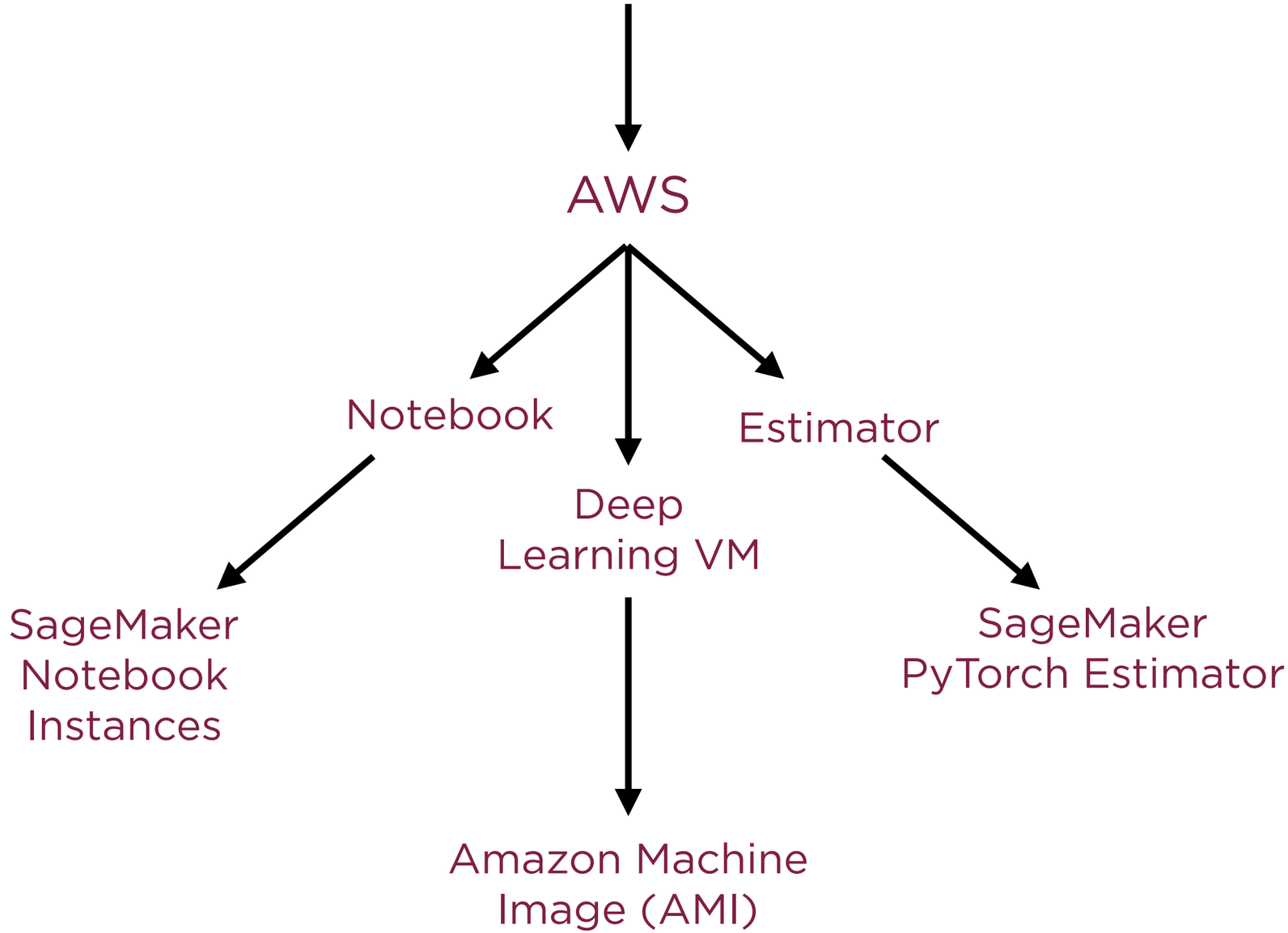


Estimator

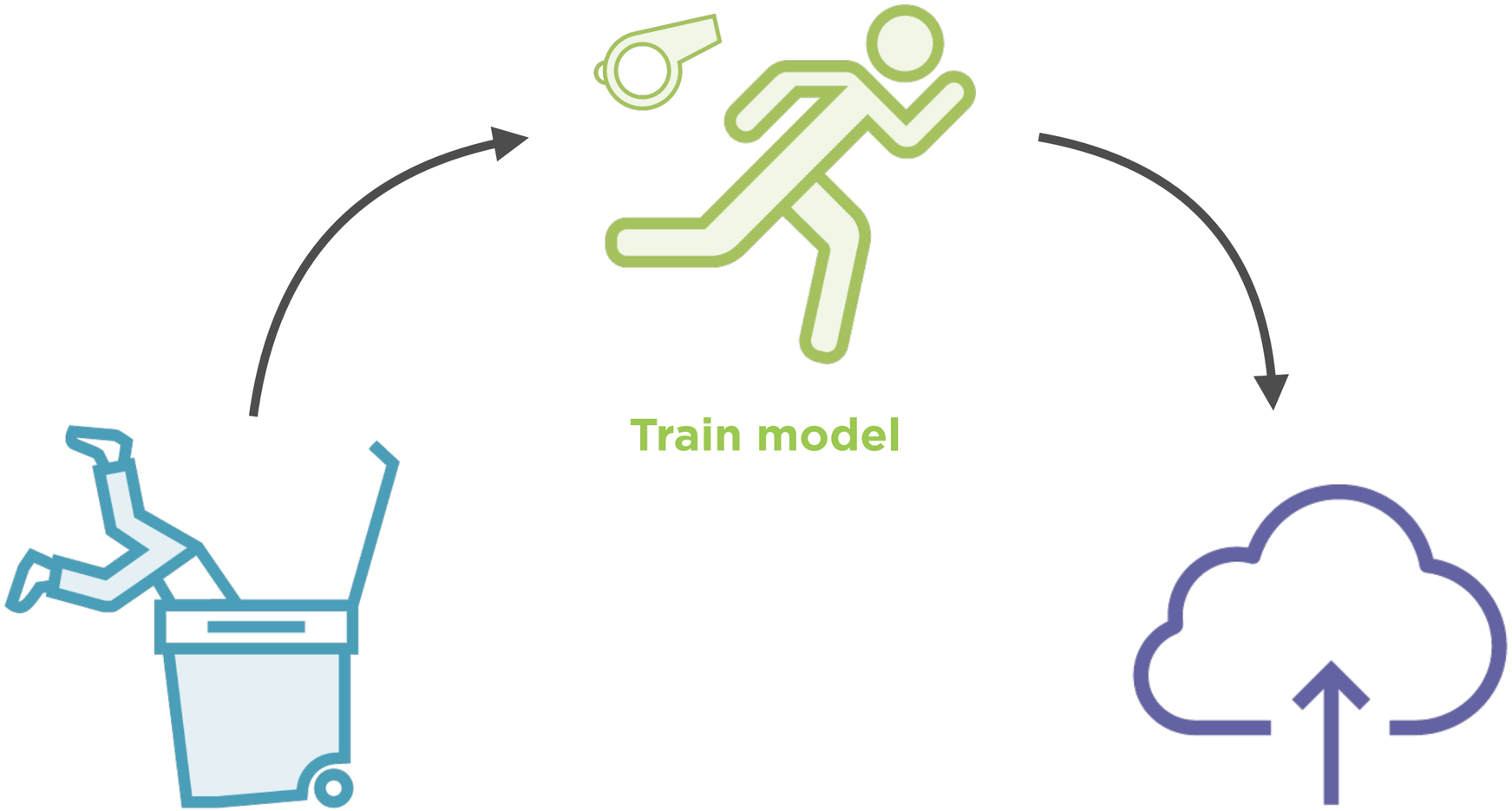
High-level API, specific to a cloud platform, that helps build, train, and deploy PyTorch models

PyTorch on the Cloud



AWS SageMaker for Deep Learning

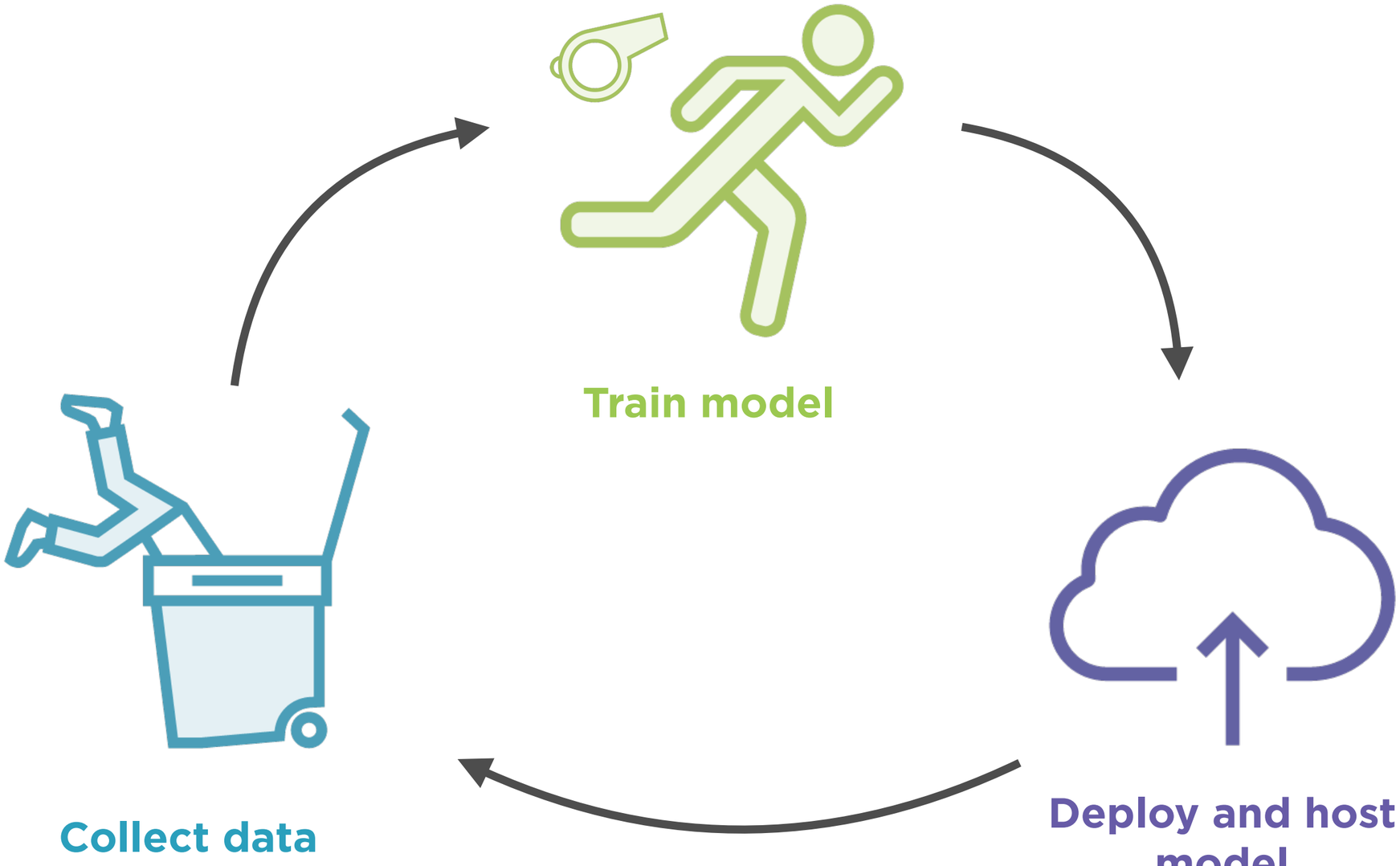
Machine Learning Workflow



Data Preparation

SageMaker runs Jupyter notebooks on instances in the cloud to explore and prepare data

Machine Learning Workflow



Model Training

Machine learning algorithms

- Traditional models, neural networks

Allocate compute resources

- VMs, memory, scaling parameters, GPUs/ CPUs

Evaluate the model

- AWS SDK for Python, Jupyter notebooks

ML Algorithms on SageMaker

Built-in algorithms

Out-of-the-box models hosted on containers on the AWS cloud

Bring your algorithm

Develop your own code in TensorFlow, Apache MXNet etc.

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SageMaker offers per-second billing for building, training and hosting your models

Demo

Prototype PyTorch models on AWS SageMaker notebook instances

PyTorch Estimators on SageMaker

Estimator

High-level API, specific to a cloud platform, that helps build, train, and deploy PyTorch models

Two Step Process

Prepare a PyTorch script to run on SageMaker

Run this script using a PyTorch Estimator

PyTorch Estimators on SageMaker

SageMaker Python SDK

Distributed PyTorch training

Save and serialize model parameters

Deploy models to endpoints

Load trained models

Serve models for prediction

Demo

Use PyTorch Estimators for distributed training on SageMaker

Amazon Machine Images (AMIs) for Deep Learning

AWS AMI

"Amazon Machine Image"

Vertical scaling - one powerful VM

Runs on EC2 instances

GPU and CPU-acceleration

No additional charge beyond EC2

AWS AMI

PyTorch

TensorFlow

Keras

Caffe, Caffe2

MXNet

Microsoft Cognitive Toolkit (CNTK)

...

Flavors of AMI

Base Images

No pre-installed source code; available in Ubuntu and Amazon Linux

Conda-based Images

Pre-installed packages and source; available in Windows 2016 in addition to Ubuntu and Amazon Linux

Demo

PyTorch on AWS deep learning AMIs for CUDA-support

Summary

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PyTorch estimators for distributed training in SageMaker

Amazon Machine Images (AMIs) for deep learning with PyTorch